



Sarin

Information for the Public

What is sarin?

Sarin, also known as GB, is one type of chemical warfare agents called “nerve agents.” Nerve agents are some of the most toxic substances ever produced by man. Many nerve agents were originally created as pesticides and then used as weapons. Sarin is not found naturally in the environment.

When pure, sarin is an odorless and colorless clear liquid that can be readily absorbed into the body by breathing, eating or drinking, and skin or eye contact. Exposure to high enough levels of sarin gas or liquid can cause death within a matter of minutes.

Where is sarin found and how is it used?

Sarin was manufactured by German scientists in the 1930s, and was given its United States military designation of “GB” (for “German Agent B”). Sarin was used in the deadly attacks of the Iran-Iraq war of the 1980s, by the Japanese cult, Aum Shinrikyo, in Matsumoto, Japan in 1994, and again in a deadly attack in the Tokyo subway in 1995.

Since their creation as pesticides, nerve agents have been adopted as chemical weapons and currently have no industrial, commercial or therapeutic value. Several countries, including the United States, have munitions loaded with various types of nerve agents, mainly in the form of projectiles, rockets, and bombs, and stockpiled in secure locations awaiting eventual dismantling and disposal.

How can people be exposed to sarin?

All nerve agents produce similar adverse health effects regardless of route of exposure (breathing, skin or eye contact, ingestion). However, initial signs and symptoms can differ depending on the route, amount and duration of exposure.

- **Breathing** – Sarin vapor is created readily at room temperature from its liquid form. Aerosols or fumes from sarin liquid can be inhaled.

Like all nerve agents, sarin vapor is heavier than air, which creates a greater exposure hazard at low-lying levels. Also, sarin evaporates at roughly the same rate as water. Because it evaporates so quickly, sarin presents an immediate but short-lived threat.

- **Drinking / Eating** – Sarin can be dissolved in water, so it is a possible contaminant of public water supplies. Sarin absorbed by the gastrointestinal tract can cause toxicity.

- **Skin/Eye Contact** – Sarin can be readily absorbed through the eyes and skin as a liquid. Vapors may also be taken up across the skin if they are present in very high concentrations or if liquid sarin is dissolved in water that comes into contact with skin or eyes.

While occupational exposure to sarin is possible in a few select sites in the United States, the vast majority of the public will likely *never* be in a position of accidental or occupational exposure, unless in the vicinity of a U.S. chemical weapons stockpile site.

What should I do if exposed to sarin?

If you think you have been exposed to sarin vapor or liquid, remove all of your clothing and wash your entire body with large amounts of soap and water as quickly as possible. Avoid making skin contact with your clothing if possible, in case there is liquid sarin on your clothing. Clothing that would need to be pulled over the head should be cut off the body to avoid further contact with skin. Seek medical care immediately.

Both liquid and vapor forms of sarin can contaminate clothing. Clothing can release sarin for about 30 minutes after contact with the vapor. High concentrations of sarin vapor can be absorbed through intact skin. Sarin liquid can also be absorbed through intact skin. Therefore, all potentially contaminated clothing should be placed in a plastic bag and sealed. This first bag should be placed inside a second plastic bag and sealed. **Do NOT** handle the bag. Alert your local health department or emergency personnel to its presence.

If you think your eyes have been exposed and you are experiencing burning or blurred vision, rinse eyes with plain water for at least 15 minutes. Seek medical care as soon as possible.

If you think you have swallowed sarin in food or water, **do NOT** induce vomiting and **do NOT** give fluids to drink. Seek medical care immediately.

How can I prevent or minimize exposure to sarin?

Under accidental or intentional release conditions, leave the area where the sarin was released. If outdoors, move upwind immediately. Find the highest ground upwind since sarin is heavier than air and sinks. If indoors, leave the building immediately. If the release is not in your immediate area, follow the instructions of the emergency broadcast system (via television or radio).

How can sarin affect my health?

The degree of reaction to exposure to any chemical depends on three main factors:

- the amount one is exposed to
- the route of exposure (breathing, touching, etc.)
- the length of time of the exposure.

The adverse health effects of exposure to sarin are more severe when it is inhaled or ingested, as opposed to exposure through skin contact only.

The general effect of all nerve agents is to disrupt how the central and peripheral nervous systems function.

What are the short-term effects?

Regardless of the route of exposure, short-term health effects seen from sarin include runny nose, tightness in the chest, pinpoint pupils, shortness of breath, excessive drooling and sweating, increased urination, abnormal heart rate and blood pressure, nausea, vomiting, abdominal cramps, muscle twitching, confusion, seizures, paralysis, coma, respiratory paralysis, and death. These incapacitating and/or lethal effects can be seen as early as 1 to 10 minutes after exposure.

Depending on the route of exposure, there may be a sequence of symptoms of sarin exposure:

- *Inhalation* – Breathing sarin liquid or vapor can cause excessive runny nose, tightness in the chest, and difficulty breathing within seconds to minutes of exposure.
- *Ingestion* – Initial symptoms of oral exposure to sarin are likely to include nausea, vomiting, diarrhea, and abdominal cramps or pain. These symptoms may occur from 15 minutes until 2 hours after exposure.
- *Skin Contact* – Onset of effects strictly from skin contact can be delayed as long as two hours after exposure. However, the greater the exposure, the shorter this latency period is. Initial symptoms may include sweating and muscle twitching.
- *Eye Contact* – Eye effects can result from local and/or systemic absorption to sarin. Pinpoint pupils, muscle spasms leading to blurred and dim vision, aching pain in the eye, and conjunctivitis occur first, typically within seconds to minutes after exposure.

What are the long-term effects?

Patients usually recover completely from mild exposure; however, there is a growing body of evidence showing that even exposure to low levels of sarin can have long-term health effects. Animal studies have shown that exposure to low levels of sarin can lead to adverse effects such as suppression of immune system response, subtle changes in brain activity, and learning and memory impairments.

Long-term effects from moderate exposures can persist as long as six weeks after recovery from exposure and can include fatigue, irritability, nervousness, and memory deficits. The presence of pinpoint pupils has been noted as long as two months following exposure.

There is no human evidence (and there is very limited animal evidence) that suggests sarin can cause cancer. Likewise, the limited data that is available provides no evidence that exposure to sarin can cause reproductive problems or birth defects.

How is sarin poisoning treated?

Treatment consists of removing the exposed individual from the source of contamination, using a nerve agent antidote as quickly as possible, and providing supportive care in a hospital setting, when possible.

Is there a medical test to determine whether I have been exposed?

The Michigan Department of Community Health does have the ability to measure levels of chemicals in your blood and urine to determine if you might have been exposed to nerve agents. These tests are not specific to any one particular type of nerve agent and any recent exposure to the closely related organophosphate pesticide compounds will also be reflected in the test results.

Submission of clinical samples must be coordinated with the Michigan Department of Community Health and the local Federal Bureau of Investigation, prior to their arrival at the state public health laboratory.

For more information on sarin:

- Contact your local public health department. Check <http://www.malphp.org/page.cfm/108/> for your jurisdiction. A list of local public health departments is also available at http://www.michigan.gov/documents/June2003LHDLList_69658_7.pdf
- Visit the Michigan Department of Community Health Office of Public Health Preparedness website <http://www.michigan.gov/ophp>
- Call the Michigan Department of Community Health Toxics and Health Hotline (1-800-648-6942)
- Visit The Centers for Disease Control and Prevention (CDC) website, <http://www.bt.cdc.gov/agent/sarin/index.asp>
- Call the Centers for Disease Control and Prevention Public Response Service Hotline:
English: 1-888-246-2675
Español: 1-888-246-2857
TTY: 1-866-874-2646
- Call the Agency for Toxic Substances and Disease Registry (1-888-422-8737)

**For immediate assistance, call the Poison Control Center hotline:
1-800-222-1222**